

in contact with the bale retaining members (50) come into contact with the ground. If the bale pusher (64) is then pivoted so as to swing away from the pivot deck (14) and the trailer (10) is moved forward, the bale retaining members (50) slide out from under the bales. The bale pusher (64) may then be pivoted to a position substantially planar with the pivot deck (14) and the pivot deck (14) may be pivoted to the position substantially planar to the trailer deck (44), so as to receive the next bales to be unloaded. In this fashion, a neat row of stacked bales may be conveniently created in the storage area.

Stacked or individual bales on the ground may be loaded with the pivot deck (14) by pivoting the pivot deck (14) so that the pivot deck (14) is substantially perpendicular to the trailer deck (44). If the trailer (10) is then moved backward so as to slide the bale retaining members (50) under the bale or bales to be loaded, the pivot deck (14) may then be pivoted to the position substantially planar to the trailer deck (44). The bale or bales thus loaded may be moved forward on the trailer deck by means of the chain conveyor (16) and the pivot deck chain conveyor (56).

The pivotal movement of the pivot deck (14) may be accomplished by any convenient mechanical means. In a preferred embodiment shown in FIGS. 12a and 12b, a hydraulic cylinder (54) is used to pivot the pivot deck (14).

The chain conveyor (16) and pivot deck chain conveyor (56) operate together to move bales forward or backward along the flat bed trailer (10). In a preferred embodiment the chain conveyor end cogs (58) and the pivot deck chain conveyor end cogs (62) are concentrically fixed to the end cogs shaft (62) such that if the chain conveyor (16) is moving, the pivot deck chain conveyor (56) will also be moving in the same direction. Axis (D), the pivot axis of the pivot deck pivot mounting (52) is also the axis of rotation of the end cogs shaft (62), FIGS. (12b) and (13).

As will be apparent to those skilled in the art, various modifications, adaptations and variations of the foregoing specific disclosure can be made without departing from the scope of the present invention. Of course, alternative configurations of the lever arms and hydraulic cylinders used in the preferred embodiment to actuate the various moving components are easily conceivable by those skilled in the art and it is intended that such alternatives are encompassed by the scope of the claims appended hereto. In other words, the specific means shown in the Figures and described above to move or actuate the various moving components are not considered essential to the invention.

What is claimed is:

1. A bale loading arm for use with a bale carrier having a longitudinal axis said loading arm comprising:
  - (a) a loading frame having a proximal end and a distal end, wherein said loading frame engages the bale carrier at its proximal end and said loading frame pivots about a substantially horizontal axis which is substantially parallel to the longitudinal axis of the carrier;
  - (b) means for pivoting the loading frame;
  - (c) a pivot member rotatably engaging the distal end of the loading frame, wherein said pivot member is substantially parallel to the pivot axis of the loading frame and is rotatable along a pivot member longitudinal axis;
  - (d) means for rotating the pivot member; and
  - (e) a bale grasper opening in a direction parallel to the longitudinal axis of the bale carrier having a grasper arm and grasping means affixed to the grasper arm; wherein the grasper arm is rotatably mounted to the pivot member about a grasper arm axis extending perpen-

dicular to said pivot member axis, extending outward from the loading frame and includes means for rotating the grasper arm.

2. The bale loading arm of claim 1 wherein the grasping means comprises a pair of opposed paddles, one of which is moveable between an open bale receiving position and a closed bale grasping position, and means for moving the moveable paddle.

3. The bale loading arm of claim 2 wherein the pair of opposed paddles extends from the grasping arm in the forward direction such that the bale carrier may be moved forward to position a bale within the bale grasping means.

4. The bale loading arm of claim 2 wherein the paddle moving means comprises a hydraulic cylinder disposed between the grasper arm and the paddle.

5. The bale loading arm of claim 1 wherein the loading frame is moved by a hydraulic cylinder and ram attached between the bale carrier and an articulating lever arm wherein said lever arm is attached to the bale carrier and the loading frame.

6. The bale loading arm of claim 1 wherein the pivot member rotation means comprises an orbit motor and chain drive.

7. The bale loading arm of claim 1 wherein the pivot member rotation means comprises a hydraulic cylinder and lever arm.

8. The bale loading arm of claim 1 wherein the grasping arm rotation means comprises an orbit motor and chain drive configuration.

9. The bale loading arm of claim 1 wherein the grasping arm rotation means comprises a hydraulic cylinder and lever arm.

10. A bale loading arm for use with a bale carrier having a longitudinal axis, said loading arm comprising:

(a) a first member having a proximal end and a distal end which extends laterally outward from the bale carrier and which pivots about a substantially horizontal axis substantially parallel to the longitudinal axis of the bale carrier;

(b) means for pivoting the first member;

(c) a second member having a longitudinal axis which rotatably and pivotally engages the distal end of the first member such that the second member rotates and pivot about a second axis orthogonal to said second member longitudinal axis and parallel to the pivot axis of the first member said second member also being rotatably mounted to said distal end of the first member for rotation about said second member longitudinal axis;

(d) means for rotating the second member about the second member longitudinal axis;

(e) means for pivoting the second member about the second axis; and

(f) bale grasping means affixed to the second member for grasping the bale and opening in a direction parallel to said bale carrier longitudinal axis.

11. The bale loading arm of claim 10 wherein the grasping means comprises a pair of opposed paddles, one of which is moveable between an open bale receiving position and a closed bale grasping position and means for moving one paddle.

12. The bale loading arm of claim 11 wherein the pair of opposed paddles extends from the second member in the forward direction such that the bale carrier may be moved forward to position a bale within the bale grasping means.

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13. The bale loading arm of claim 11 wherein the paddle moving means comprises a hydraulic cylinder disposed between the second member and the paddle.

14. The bale loading arm of claim 10 wherein the first member pivot means comprises a hydraulic cylinder and ram attached between the bale carrier and an articulating lever arm wherein said lever arm is attached to the bale carrier and the first member.

15. The bale loading arm of claim 10 wherein the second member rotation means comprises an orbit motor and chain drive.

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16. The bale loading arm of claim 10 wherein the second member rotation means comprises a hydraulic cylinder and lever arm.

17. The bale loading arm of claim 10 wherein the second member pivot means comprises an orbit motor and chain drive configuration.

18. The bale loading arm of claim 10 wherein the second member pivot means comprises a hydraulic cylinder lever arm.

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